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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/712,795	11/14/2000	Harold G. Craighead	1153.010US1	8906

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EXAMINER

CHEU, CHANGHWA J

ART UNIT	PAPER NUMBER
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1641

DATE MAILED: 07/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/712,795

Applicant(s)

CRAIGHEAD ET AL.

Examiner

Jacob Cheu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04/21/03
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-61 is/are pending in the application.
- 4a) Of the above claim(s) 27-61 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Applicant's amendment filed on April 21, 2003 has been received, entered into record and considered. The following information provided in the amendment affects the instant application:

1. Claims 7, 9 and 21 are amended.
2. Remarks drawn to the rejections of claims 1-26 under 35 U.S.C. 103 (a).

Claim Rejections - 35 USC § 112

The rejection of claims 7, 9 and 21 under 35 U.S.C § 112, second paragraph, has been overcome by the instant amendment.

Claim Rejections - 35 USC § 103

1. Claims 1-3, 6-7, 9-19, 21, 22 and 24 were rejected under 35 U.S.C. 103(a) as being unpatentable over Lang et al. (Appl. Phys. A (1998) 66: S61-64) in view of Baselt et al. (J. Vac. Sci. Technol. (1996) 14: 789-793) and being maintained.

Lang et al. teach identifying gases or vapors, e.g. H₂ or alcohols, having a mass by an immobilized portion structure adapted a second portion for resonating, wherein illuminating on the second portion with a light source in an ambient condition based on a frequency of the mass of the gases or vapors, and measuring the light deflection by a photodetector and providing the change of light deflection through voltage signal to a spectrum analyzer and processor. (See Figures 1 and 2; page S61, right column, second paragraph) Lang et al. also teach using the cantilever beam, i.e. 500 μm long, as the detecting means, wherein this device can be operated under ambient air, vacuum, liquid, and thermal noise. (S 61 right column, second paragraph; S 63, left column, end of last paragraph) However, Lang et al. do not explicitly teach (1) immobilization of binding partners that bind to the various analytes on the portion on the device, such as pathogen, bacteria, virus, ligand, protein or DNA; (2) using a piezoelectric drive for the device.

Baselt et al. teach using a piezoelectric cantilever coated with binding partners, e.g. antibodies for detecting of biological species, such as proteins, toxins, virus, DNA and ligands.

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(See Abstract; Section of Force Transducer; Cited Reference 5 and Figure 1) Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Lang et al. by immobilizing binding partners on the device as taught by Baselt et al., in order to detect multiple biological species, such as microorganism, protein, DNA and metallic iron-containing analytes, in a sample of interest.

2. Claim 20 was rejected under 35 U.S.C. 103 (a) as being unpatentable over Lang et al. in view of Baselt et al. as applied in claims 1-3, 6-7, 9-19, 21, 22, 24 and, further in view of Lee et al. (USP 5807758) and being maintained.

Both Lang et al. and Baselt et al. references have been discussed above but fail to explicitly teach using a chelator as binding partner to bind a metallic iron analyte. Nevertheless, Lee et al. teach using the chelators as the recognizing and selectively binding molecules for metal ions in an immunoassays of analytes of interests. (See column 1, line 35-45) Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided the modified system of Lang and Baselt et al. with the chelator as binding partners as taught by Lee et al., in order to detect metallic iron in a sample of interest.

3. Claims 4, 5, 8 and 23 were rejected under 35 U.S.C. 103 (a) as being unpatentable over Lang et al. in view of Baselt et al., as applied to claims 1 and 22, and further in view of Quate et al. (USP 6203983).

Lang et al. and Baselt et al. references have been discussed but are silent as to teach using split photodiode, silicon cantilever and out of plane mode (i.e. vertical) vibrating cantilever beam. Quate et al. teach using split photodetectors, silicon-based composition for biosensor and different modes of cantilever vibration, i.e. vertical mode. (See Column 2, line 12-20; Column 3, line 20-29; Column 5, line 60-65) Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system of Lang et al. with the modified split photodiode, silicon cantilever and out of plane vibrating mode as taught by Quate

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et al., as an alternative form of detecting analytes using micromechanical biosensor since it is considered conventional in the art.

4. Claim 25-26 were rejected under 35 U.S.C. 103 (a) as being unpatentable over Lang et al. in view of Baselt et al., as applied in claim 1, and further in view of Carr et al. (J. Vac. Sci. Technol. B (1997) 15: 2760-2763) and being maintained.

Lang et al. reference has been discussed but is silent to the structure recited as claim 25. Carr et al. teach exploring the physical designs of the micromechanical sensor device as to modulate light and minimize interference effect. (See page 2760, Section IV) Carr et al. disclose several linear device structures all having a first end, a second end, and a middle region. (See Figures 2-4) Carr et al. also suggest that these devices would be useful in chemical sensing or detection of small forces by adsorbing materials unto the middle region of the device, i.e. resonating paddle. (See page 2762, left Column, second paragraph; Conclusion) Therefore, it would have been obvious to one of ordinary skill in the art to provide the system of Lang et al. with a mechanical sensor as taught by Carr et al., for the benefits of optimal detection of analyte using micromechanical cantilever method.

With respect to claim 26, applicants recite a disk-shaped member having a perimeter and a center region. It would have been an obvious matter of design choice to have the instant recited disk-shaped for analysis, since such a modification would have been involved a mere change in the shape of a component. A change in the shape is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955) Therefore, the rejection is being maintained.

Response to Amendment

5. Applicant's arguments with respect to claims 1-26 have been considered but are not persuasive.

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With respect to claim 1, applicant argues that Baselt et al. use "waving a small magnet over the cantilever [to produce] a measurable deflection" (page 3, third full paragraph), whereas Lang use "resonance frequency shift" (page 62, Col. 2, second full paragraph). Thus, "it appears the principle of operation are different and therefore, the requisite motivation for combining or modifying Lang and Baselt is lacking." (See Amendment, page 6, first paragraph) In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The rejection was not based on the Baselt's operation principle, e.g. magnet magnitude measurement. Rather, the rejection was made based on the remedy of the insufficiency of Lang by Baselt, i.e. providing an immobilized binding partner that binds to the analyte.

Furthermore, applicant also argues that there is no structure in view of the combination of both Lang and Baselt references, having an immobilized binding partner that binds to an analyte, wherein the structure resonates at a frequency based on the mass of the analyte, as recited in the instant claim 1. The examiner would like to point out that Baselt et al. teach coating cantilever with antibody, i.e. immobilized binding partner, binds to the antibody-specific analyte. (Figures 1 and 2) The reference of Lang teaches measuring resonant frequency of analyte based on the change of mass. (page S65, equation (3)) Therefore, both references of Lang and Baselt contain all the features of the instant claim 1. Accordingly, rejections of the dependent claims 2, 3, 6-7, 9-19, 21-22 and 24 are also maintained.

With respect to claim 20, 4, 5, 8, 23 and 25-26, the similar arguments have been made as to lack of proper motivation to combine Lang and Baselt with Lee (claim 20), Quate (claims 4, 5, 8, 23) and Carr (claim 25-26). As discussed supra, the combined references of Lang and Baselt have been established properly. Therefore, the prima facie obviousness by additional features as recited in claims 20, 4, 5, 8, 23 and 25-26 is maintained since

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the additional features are considered conventional, commonly practiced, or involving only ordinary skill in the art.

Conclusion

6. No claim is allowed.

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob Cheu whose telephone number is 703-306-4086. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 703-305-3399. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-4556 for regular communications and 703-308-4556 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3399.

Jacob Cheu
Examiner
Art Unit 1641



***July 11, 2003



LONG V. LE
SUPERVISORY PATENT EXAMINER
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07/11/03